

Having thus defined the invention the following is claimed:

1. A closed locking ring for a device having a locking groove, wherein said locking ring includes an outer closed edge zone which slants at an angle towards the axis of said locking ring and a radially inner circumferentially interrupted engagement zone which slants at an angle towards the axis of said locking ring, said angle of said outer closed edge zone being different from said angle of said radially inner circumferentially interrupted engagement zone.
2. The closed locking ring as defined in claim 1, where said device includes a shaft, a shaft stub, a bore, or combinations thereof.
3. The closed locking ring as defined in claim 1, wherein said angle of said radially inner circumferentially interrupted engagement zone is less than said angle of said outer closed edge zone.
4. The closed locking ring as defined in claim 1, wherein said angle of said outer closed edge zone is between about 0°-40° after installation of said locking ring with said locking groove.
5. The closed locking ring as defined in claim 1, wherein said angle of said radially inner circumferentially interrupted engagement zone is between and about 0°-20° after installation of said locking ring with said locking groove.
6. The closed locking ring as defined in claim 1, wherein said angle of said radially inner circumferentially engagement zone is greater than said angle of said outer closed edge zone.
7. The closed locking ring as defined in claim 1, wherein said radially inner circumferentially interrupted engagement zone is axially and radially deformable and thereby adjusts to said locking groove.
8. The closed locking ring as defined in claim 1, wherein at least a portion of said radially inner circumferentially interrupted engagement zone is permanently deformable.
9. A closed locking ring for a device having a locking groove, wherein said locking ring includes an outer closed edge zone which slants at an angle towards the axis of said locking ring and a radially inner circumferentially interrupted engagement zone which slants at an angle towards the

axis of said locking ring, said slanting angle of said radially inner circumferentially interrupted engagement zone being about 15°-45° before installation of said locking ring with said locking groove.

10. The closed locking ring as defined in claim 9, where said device includes a shaft, a shaft stub, a bore, or combinations thereof.

11. The closed locking ring as defined in claim 9, wherein said slanting angle of said radially inner circumferentially interrupted engagement zone is about the same as said slanting angle of said outer closed edge zone.

12. The closed locking ring as defined in claim 9, wherein said slanting angle of said radially inner circumferentially interrupted engagement zone is larger than said slanting angle of said outer closed edge zone.

13. The closed locking ring as defined in claim 9, wherein said slanting angle of said radially inner circumferentially interrupted engagement zone is less than said slanting angle of said outer closed edge zone.

14. The closed locking ring as defined in claim 9, wherein said radially inner circumferentially interrupted engagement zone is axially and radially deformable and thereby adjusts to said locking groove.

15. The closed locking ring as defined in claim 9, wherein at least a portion of said radially inner circumferentially interrupted engagement zone is permanently deformable.

16. A closed locking ring for a device having a locking groove, wherein said locking ring includes an inner closed edge zone which slants at an angle towards the axis of said locking ring and a radially outer circumferentially interrupted engagement zone which slants at an angle towards the axis of said locking ring, said angle of said outer closed edge zone being different from said angle of said radially inner circumferentially interrupted engagement zone.

17. The closed locking ring as defined in claim 16, where said device includes a shaft,

a shaft stub, a bore, or combinations thereof.

18. The closed locking ring as defined in claim 16, wherein said angle of said radially outer circumferentially interrupted engagement zone is less than said angle of said inner closed edge zone.

19. The closed locking ring as defined in claim 16, wherein said angle of said inner closed edge zone is between about 0°-40° after installation of said locking ring with said locking groove.

20. The closed locking ring as defined in claim 16, wherein said angle of said radially outer circumferentially interrupted engagement zone is between and about 0°-20° after installation of said locking ring with said locking groove.

21. The closed locking ring as defined in claim 16, wherein said angle of said radially outer circumferentially engagement zone is greater than said angle of said inner closed edge zone.

22. The closed locking ring as defined in claim 16, wherein said radially outer circumferentially interrupted engagement zone is axially and radially deformable and thereby adjusts to said locking groove.

23. The closed locking ring as defined in claim 16, wherein at least a portion of said radially inner circumferentially interrupted engagement zone is permanently deformable.

24. A closed locking ring for a device having a locking groove, wherein said locking ring includes an inner closed edge zone which slants at an angle towards the axis of said locking ring and a radially outer circumferentially interrupted engagement zone which slants at an angle towards the axis of said locking ring, said slanting angle of said radially inner circumferentially interrupted engagement zone being about 15°-45° before installation of said locking ring with said locking groove.

25. The closed locking ring as defined in claim 24, where said device includes a shaft, a shaft stub, a bore, or combinations thereof.

26. The closed locking ring as defined in claim 24 wherein said slanting angle of said radially outer circumferentially interrupted engagement zone is about the same as said slanting angle of said inner closed edge zone.

27. The closed locking ring as defined in claim 24, wherein said slanting angle of said radially outer circumferentially interrupted engagement zone is larger than said slanting angle of said inner closed edge zone.

28. The closed locking ring as defined in claim 24, wherein said slanting angle of said radially outer circumferentially interrupted engagement zone is less than said slanting angle of said inner closed edge zone.

29. The closed locking ring as defined in claim 24, wherein said radially outer circumferentially interrupted engagement zone is axially and radially deformable and thereby adjusts to said locking groove.

30. The closed locking ring as defined in claim 24, wherein at least a portion of said radially inner circumferentially interrupted engagement zone is permanently deformable.

31. The closed locking ring as defined in claim 24, wherein said locking ring comprises a closed interior between said inner closed edge zone and an axis of said locking ring.

32. A device having a circumferentially closed locking ring fixed axially in a groove of the device, said locking ring including an outer closed edge zone which slants towards an axis of said locking ring and a radially inner circumferentially interrupted engagement zone which slants towards the axis of said locking ring, said angle of said outer closed edge zone being different from said angle of said radially inner circumferentially interrupted engagement zone, said device including a shaft, a shaft stub, a bore, or combinations thereof.

33. The device as defined in claim 32, wherein said angle of said radially inner circumferentially interrupted engagement zone is less than said slanting angle of said outer closed edge zone after installation of said locking ring in said groove.

34. The device locking ring as defined in claim 32, wherein said slanting angle of said outer closed edge zone is between about 0° - 40° .

35. The device as defined in claim 32, wherein said slanting angle of said radially inner circumferentially interrupted engagement zone is between about 0° - 20° .

36. The device as defined in claim 32, wherein said angle of said radially inner circumferentially interrupted engagement zone is greater than said slanting angle of said outer closed edge zone.

37. The device as defined in claim 32, wherein said angle of said radially inner circumferentially interrupted engagement zone is less than said slanting angle of said outer closed edge zone.

38. The device as defined in claim 32, wherein the diameter of the device is larger on one side of the groove than on the other side so that an abutment or shoulder having an engagement zone is created for said radially inner circumferentially interrupted engagement zone of said locking ring.

39. The device as defined in claim 32, wherein said groove is nonrectangular shaped in cross-section.

40. The device as defined in claim 32, wherein a cross-section of said groove is tapered at least partly from its opening to its base.

41. A device having a circumferentially closed locking ring fixed axially in a groove in said device, said locking ring including an inner closed edge zone which slants towards the axis of said locking ring and a radially outer circumferentially interrupted engagement zone which slants towards the axis of said locking ring, said angle of said closed edge zone being different from said angle of said interrupted engagement zone, said device including a shaft, a shaft stub, a bore, or combinations thereof.

42. The device as defined in claim 41, wherein said angle of said radially outer circumferentially interrupted engagement zone is less than said slanting angle of said inner closed

edge zone.

43. The device as defined in claim 41, wherein said angle of said radially outer circumferentially interrupted engagement zone is greater than said slanting angle of said inner closed edge zone.

44. The device as defined in claim 41, wherein said slanting angle of said inner closed edge zone is between about 0°-40°.

45. The device as defined in claim 41, wherein said slanting angle of said radially outer circumferentially interrupted engagement zone is between about 0°-20°.

46. The device as defined in claim 41, wherein the diameter of the device is larger on one side of the groove than on the other side so that an abutment or shoulder having an engagement zone is created for said radially outer circumferentially interrupted engagement zone of said locking ring.

47. The device as defined in claim 42, wherein said groove is non-rectangular shaped in cross-section.

48. The device as defined in claim 42, wherein said cross-section of said groove is tapered at least partly from its opening to its base.

49. A method for connecting a device comprising:
providing a circumferentially closed locking ring to engage a groove on said device, said locking ring including an outer closed edge zone which slants towards the axis of said locking ring and a radially inner circumferentially interrupted engagement zone which slants towards the axis of said locking ring, said angle of said outer closed edge zone being different from said angle of said radially inner circumferentially interrupted engagement zone;
positioning said locking ring approximately into said groove; and,
plastically bending said radially inner circumferentially interrupted engagement zone of said circumferentially closed locking ring at least partially towards an axis of said locking ring to at least partially cause tips of said engagement zone to engage said groove.

50. The method as defined in claim 49, where said device includes a shaft, a shaft stub, a bore, or combinations thereof.

51. The method as defined in claim 49, including cupping at least said interrupted engagement zone to provide a sufficient diameter for axially moving said circumferentially closed locking ring on said device.

52. The method according to claim 49, wherein said step of cupping includes the use of a deforming tool that is placed on said closed edge zone of said locking ring and exerts a deformation movement in the direction coaxial to the axis of said locking ring in a way that at least a portion of said engagement zone is deformed towards the axis of said locking ring to facilitate in the entering and engaging said groove.

53. The method as defined in claim 51, including the step of cutting out a piece of material from the radially inner contour of said locking ring prior to step of cupping and after said step of cupping another radially outer contour is cut out.

54. The method as defined in claim 51, wherein during said cupping step at least said interrupted engagement zone receives a cone like shape.

55. A method for connecting a device comprising:
providing a circumferentially closed locking ring to engage a groove on said device, said locking ring including an inner closed edge zone which slants towards the axis of said locking ring and a radially outer circumferentially interrupted engagement zone which slants towards the axis of said locking ring, said angle of said outer closed edge zone being different from said angle of said radially inner circumferentially interrupted engagement zone;
positioning said locking ring approximately into said groove; and,
plastically bending said radially inner circumferentially interrupted engagement zone of said circumferentially closed locking ring at least partially towards an axis of said locking ring to at least partially cause tips of said engagement zone to engage said groove.

56. The method as defined in claim 55, where said device includes a shaft, a shaft stub, a bore, or combinations thereof.

57. The method as defined in claim 55, including cupping at least said interrupted engagement zone to provide a sufficient diameter for axially moving said circumferentially closed locking ring on said device.

58. The method according to claim 57, wherein said step of cupping include the use of a deforming tool that is placed on said closed edge zone of said locking ring and exerts a deformation movement in the direction coaxial to the axis of said locking ring in a way that at least a portion of said engagement zone is deformed towards the axis of said locking ring to facilitate in the entering and engaging said groove.

59. The method as defined in claim 57, including the step of cutting out a piece of material from the radially inner contour of said locking ring prior to step of cupping and after said step of cupping another radially outer contour is cut out.

60. The method as defined in claim 57, wherein during said cupping step at least said interrupted engagement zone receives a cone like shape.

61. A deforming tool to plastically bend an interrupted engagement zone of a locking ring, said locking ring having a closed edge zone and a circumferentially interrupted engagement zone at least partially towards the axis of said locking ring, said deforming tool having receiving means for receiving and engaging a part of said locking ring and pressing means abutting on part of said locking ring.

62. The deforming tool as defined in claim 61, wherein said receiving means includes a groove to receive a rim portion of said locking ring.

63. The deforming tool as defined in claim 61, wherein said pressing means includes a shoulder positioned adjacent to said receiving means.